WHAT IS CLAIMED IS:

1. A mold clamping apparatus comprising:

a mold having a longer side and a shorter side and in which a mold opening force is generated by applying a pressure for opening the mold to the inside of said mold;

a frame including a holding portion for holding said mold resisting the generated mold opening force and an open portion allowing said mold to be inserted into/taken out from said holding portion in a direction of the shorter side of said mold;

mold moving device that moves said mold to insert/take out said mold into/from said holding portion through the open portion in said frame; and

mold opening/closing device that opens/closes the mold located outside the frame.

2. A mold clamping apparatus according to claim 1, wherein

said frame comprises an overhang portion and a base portion, composing the holding portion, and a post portion for joining the overhang portion to the base portion, and

molding parameters of respective portions of the frame are set up so that a stress index value K calculated according to the following expression is in a range of 0.2 to 15:

$$K = [(6\Phi E/D^2) + (\Phi/D)](1 + (0.0188D/C + 0.243)(D/R)^{1.18})$$

wherein

C is a maximum width of the overhang portion;

D is a maximum width of the post portion;

E is a minimum distance from the post portion to the center in the mold to which a pressure is applied;

R is a maximum curvature radius of a connecting corner portion between he overhang portion or base portion and the post portion; and

Φ is a width of a projection plane perpendicular to a direction of a mold opening force as a portion to which a pressure in the mold is applied.

3. A mold clamping apparatus according to claim 1, wherein

said frame comprises a plurality of the holding portions and open portions.

4. A mold clamping apparatus according to claim 3, wherein

the mold moving device moves a plurality of molds to insert or take out said molds into/from the holding portion through each open portion.

5. A mold clamping apparatus according to claim 1 further comprising:

mold closing force application device that applies a force for closing the mold resisting the mold opening force of the mold.

6. A mold clamping apparatus according to claim 5, wherein the mold closing force application device applies a force higher than the mold opening force of the mold in a direction of closing the mold using a pressure applied to the inside of the mold.

7. A mold clamping apparatus according to claim 1 further comprising:

axially pressing device for hydraulic pressure bulging processing, provided on the mold.

8. A mold clamping apparatus according to claim 1, wherein

predetermined functional device necessary for molding is

provided such that it is protruded from a face not opposing the frame of the mold.

9. A mold clamping apparatus according to claim 1, wherein

said frame is constructed by laminating a plurality of sheet-like frame materials in the longitudinal direction of the frame.

10. A mold clamping apparatus according to claim 9, wherein

the strength of the surface of said frame material is higher than the strength of the central portion in the longitudinal direction of the frame material.

11. A mold clamping apparatus according to claim 9, wherein a stress concentration portion of said frame material is chamfered.

12. A mold clamping apparatus according to claim 11, wherein

said frame material has a decarburized layer on the surface thereof, and

the decarburized layer is removed from a portion of said frame material subjected to the chamfering processing.

13. A mold clamping apparatus according to claim 11, wherein

residual compression stress is generated in a tensile stress concentration portion of the frame material.

14. A mold clamping apparatus according to claim 9, wherein

each of the plural laminated frame materials has a different strength.

15. A mold clamping apparatus according to claim 9, wherein

each of the plural laminated frame materials has a different strength and a different thickness.

16. A mold clamping apparatus according to claim 9, wherein

said frame is constructed by laminating thick frame materials

each having a low strength and thin frame materials each having a high strength in combination.

17. A mold clamping apparatus according to claim 9, wherein

said frame is constructed by combining frame materials having a single holding portion and open portion with frame materials having plural holding portions and open portions.

18. A mold clamping apparatus according to claim 9, wherein

said frame is constructed by arranging the frame materials corresponding to the shape of a mold to be held.

19. A mold clamping apparatus according to claim 9, wherein

said frame is constructed by laminating the frame materials each having a different thickness depending on the shape of a mold to be held.

20. A mold clamping apparatus according to claim 9, wherein

said mold has a predetermined functional device necessary for molding provided protrudedly on the mold to be held and said frame has a space capable of accommodating the functional device by laminating frame materials adjacent each other at a predetermined position such that they are apart from each other.

21. A mold clamping apparatus according to claim 9, wherein

said mold has a predetermined functional device which is necessary for molding provided protrudedly on the mold to be held and is detachably connected to the mold,

said frame contains a space by laminating frame materials adjacent each other at a predetermined position such that they are apart from each other, and

said functional device is disposed in said space.

22. A mold clamping apparatus according to claim 9, wherein

said frame contains a space by laminating frame materials adjacent each other at a predetermined position such that they are apart from each other, and

said mold moving device is disposed within said space.

23. A mold clamping apparatus further comprising:

a mold in which a mold opening force is generated by applying a pressure for opening the mold;

a frame having a holding portion for holding the mold resisting the generated mold opening force; and

mold closing force application device, provided in the holding portion of the frame, that applies a force higher than the mold opening force in a direction of closing the mold using a pressure applied to the inside of the mold.

24. A mold clamping apparatus according to 23, wherein

said frame is constructed by laminating a plurality of sheet-like frame materials in the longitudinal direction of the frame.

25. A mold clamping apparatus according to claim 23, wherein

said frame is constructed by combining frame materials having a single holding portion and open portion with frame materials having plural holding portions and open portions.

26. A mold clamping apparatus according to claim 23, wherein

said frame is constructed by arranging the frame materials corresponding to the shape of a mold to be held.

27. A mold clamping apparatus according to claim 23, wherein

said frame is constructed by laminating the frame materials each having a different thickness depending on the shape of a mold

to be held.

28. A mold clamping apparatus according to claim 23, wherein

said mold has a predetermined functional device necessary for molding provided protrudedly on the mold to be held and said frame has a space capable of accommodating the functional device by laminating frame materials adjacent each other at a predetermined position such that they are apart from each other.

29. A mold clamping apparatus according to claim 23, wherein

said mold has a predetermined functional device which is necessary for molding provided protrudedly on the mold to be held and is detachably connected to the mold,

said frame contains a space by laminating frame materials adjacent each other at a predetermined position such that they are apart from each other, and

said functional device is disposed in said space.

30. A mold clamping apparatus according to claim 23, wherein

said frame contains a space by laminating frame materials adjacent each other at a predetermined position such that they are apart from each other, and

said mold moving device is disposed within said space.

31. A mold clamping method for clamping a mold having a longer side and a shorter side and in which a mold opening force is generated by applying a pressure for opening the mold to the inside of the mold, comprising the steps of:

preparing a frame containing a holding portion for holding the mold resisting the generated mold opening force and an open portion which allows the mold to be inserted into/taken out from

the holding portion; and

inserting the mold into the holding portion through the open portion in the frame by moving the mold in a direction of the longer side of said mold and closing and holding the mold, and after molding, taking out the mold from the holding portion through the open portion and opening the mold outside the frame.